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CONTENTS

The Use and Abuse of Language: HAROLD CHAPMAN BROWN... 533

The Problem of Pragmatism: FREDERICK J. E. WOODBRIDGE.... 541

Book Reviews:

Buchanan's Poetry and Mathematics: ERNEST NAGEL..... 552

Journals and New Books..... 557

Notes and News..... 559

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By FRANK C. SHARP, PH.D.

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THE JOURNAL OF PHILOSOPHY

THE USE AND ABUSE OF LANGUAGE

OF all animals man is the most inveterate noise maker. As most of his enjoyments are accompanied by the making of noise, he seems to have undergone a reverse conditioning so that if he is surrounded by noise, he feels as if he is enjoying himself. At least such an hypothesis would explain much in the behavior of holiday crowds and in the prevailing practices of radio and phonograph operation. Animals acquire interest in noises that are indicative of danger, helpful to the acquisition of food, and incidental to courtship. Man is an animal, but he possesses a far greater capacity than other animals to make varied noises and to respond with subtle discriminatory responses to slight changes in the character of the noises that he makes or hears. It follows that the range of his activities that can be controlled by sound is vastly increased.

Unless we care to credit the story of Adam as a scientific transcription of fact and agree that God Himself wrought language into the structure of man as He molded his body from clay, or breathed it into him with the breath of life, we must seek the origin and significance of language in this peculiarity of human beings. Behaviorists explain its advent through the conditioning of response mechanisms to sound stimuli. This is probably correct, but there has been very little attention paid to the question of the character and range of the processes that become so conditioned and to the limitations the nature of the situation imposes on its efficacy. It is generally assumed that the function of language is to communicate ideas. Hence the usual procedure has been to point out that sounds made while reacting to a thing or situation come to replace the thing or situation in generating a recurrence of the behavior to which it gave rise, with due allowance for the variations that later result from the changed environment in which the sound stimulus recurs.

This explanation touches only a part of the fact and that part is of secondary importance to the business of living. When we first learn to imitate vocally noises that have acquired significance and to utilize special conditionings that arbitrary vocalizations have acquired, we have committed ourselves to the use of language. Our first experiments with the new power, however, are not directed toward the communication of ideas. What time the infant has no

language but a cry, intentional vocalization is directed solely at obtaining relief from discomfort, and this function, however much it may later become disguised, probably underlies all utterance. With increased control of the powers of vocalization, first cries differentiate to indicate hunger discomfort, pain discomfort, or the need of more intimate attention, and later other sounds begin to take on the function of indicating want of, or aversion to, persons and things.

Such language is effectively holophrastic and knows nothing of words. And yet some philosophers, like Mr. Russell, can insist that the origin of language is to be found in words, or, what is still worse, in the roots of words! Mr. Russell's only evidence seems to be somewhat sardonic witticisms directed against those who investigate the language of the Patagonians, and extraordinarily casual observations of his own children and others. To assert the primacy of roots in the face of a philologian like Jespersen is surely a highly dubious procedure. As to children, it follows from the conditions of learning to speak that children will generally, but not always, first utilize what we adults would describe as isolated words. But it is obvious that these word-sounds do not have for the child the restricted meaning of isolated words, but are uttered with intonations giving them the import of sentences. The joyous "mama, mama," when the lady in question returns from an outing, conveys all that in adult language would be expressed by such a sentence as "My, but I'm glad to see you, mother," and other word-sounds receive inflections that complete their meanings by such additions as "I want," "give me," or "take away." Those experienced in teaching children to read, after they have acquired a certain fluency in speech, are frequently met by the difficulty of getting sentences understood as analyzable into words, and even for adults words in significant groups are more easily understood than words by themselves. How few of us can give good definitions of terms we use accurately in everyday conversation! Just what is meant, say, by "nevertheless"? To grasp the meaning of words abstracted from sentences is surely a late achievement in the development both of the individual and of the race.

It is not long before family and associates begin to prove obdurate to the naïve self-assertion of this primitive speech. The first recourse is to crying. If this is futile, a new use of language emerges of which the function is propitiatory. It is discovered that certain inflections of the voice and certain word groups, unrelated to the action that we wish to have performed, nevertheless produce in others attitudes that make them more likely to carry out our wishes. The literal meaning of "nice old mummie" is unimportant, but the influence of the phrase on "mummie's" attitude

toward requests is not. The process of propitiation so commenced persists throughout life and becomes vastly complicated in the phraseology of courtesy, polite inquiries, and some joking and story-telling.

It is also discovered that the characteristics of things can be learned from others through language without the delays and hazards of direct experimentation. At first this potentiality is restricted in use to immediate surroundings and the momentarily interesting, but the practice is soon extended to that which may later become practically relevant, and finally expands into something very like disinterested curiosity. From the propitiatory modes of discourse it is also learned that others may be provoked to display characteristic feeling attitudes from which much can be learned that is useful for successful propitiation. Talking to see what other people will say and some forms of joking and story-telling are the instrumentalities of this sort of exploration. Here again the motivation expands from the immediate impulse to get something done, to a more general effort to maintain some sort of desirable attitude in our associates, and finally to something approaching disinterested curiosity as to the characters of men.

Thus the naïve self-assertion motivating primitive speech becomes amazingly disguised. In adults and from the social point of view we can distinguish four main functions of language: first, the direct instigation of determinate action; secondly, the provoking of revelations as to the character and range of experience of others; thirdly, the communication of knowledge; and fourthly, the control of affective states. Of the first category are commands, requests, warnings and the like; of the second, random story-telling and joking; of the third, serious conversation and scientific discourse; and of the fourth, premeditated story-telling and joking, the devices of propaganda, and, in a more abstract way, the literary arts. The lines of distinction between these categories of linguistic usage are, of course, not rigidly maintained in ordinary discourse. At most there is emphasis of some special function, but let the reader analyze such literature as Fichte's *Addresses to the German Nation* and he will be able to distinguish elements almost inextricably intertwined, calculated to subserve each of these interests.

The control of human affective states is a difficult art to master and, in our present ignorance of psychology, less easy to exhibit as dependent upon fundamental principles than the control of ideas through communication of the character of facts. Then, too, our knowledge of things has been increasing with great rapidity and immediate practical needs have compelled us to acquire facility in spreading such knowledge, while we have been living under a social system armed with powers of compulsion, that lessened the

necessity for socializing effective states. The arts have generally carried on this work, but largely under individual initiative with some special encouragement from governments or institutions, like the church, where they have been recognized as useful. To-day the welter of propaganda that accompanies the democritization of society, and the competition of business with its sure-fire salesmanship and instigatory advertising, gives emotional control a new importance.

Practice here transcends the bounds of oral discourse, for the arts, since art is the language of emotion, may all be turned to account. Indeed speech, shaped toward precision in the communication of ideas, is perhaps not the most potent instrument at our command. Whereas experimental esthetics can demonstrate certain potentialities of color, line, rhythm, tonal quality, and pitch change to provoke emphatic effects necessary to the production of mood, when words are used, our training to look through them to the things for which they stand prevents the sensory character of language from attaining its full effectiveness. Modernistic poetry has tried to develop a pure music of speech, but the vicarious presence of things that are evoked by words as images is a more important stimulus than the sensory character of the language itself.

In the task of emotional determination through language, to supplement the vocal inflections of oratory, we must utilize the affective significance things or situations have acquired in our cultural history. These values tend to be highly individualistic, but they are socialized, transformed, and preserved by the arts. Just as science replaces individual experience as a basis for interpreting the practical significance of things, so art replaces individual experience in fixing their emotional significance. Sometimes social and cultural changes shift interests so that old emotional associations become meaningless almost before we are aware of it and despite the artists. Thus the word "home" used to have a rich background of feeling, strongly associated with the dwelling in which the intimate family life was carried on. But now, through the migratory character of our population, the growth of cities, and the prevalence of the habit of moving, the association with a particular dwelling place is hardly maintained except as a mode of sentimentality, i.e., emotion divorced from relation to action, in such songs as "My Old Kentucky Home," or its vaudeville equivalents, and the feeling itself is becoming little more than a shadow since movies, club life, and automobiles have exerted their disintegrating influence on family life. Realtors can now shamelessly advertise "elegant, up-to-date, homes for sale" as if a home could be "elegant," "up-to-date," or "sold!"

Sometimes shifting of emotional significances is due to the direct

onslaught of a reformer who believes the traditional mode of feeling undesirable. The attacks of Ibsen and Shaw on current social institutions and practices are of this type. In one way or another the meanings of emotional symbols are constantly shifting and herein lies a great difficulty in this sort of communication. The cultural status and stage of development of the audience must always be kept in mind. Dialectically it might appear that such communication would not be possible without fixed symbols, but practically it is, with only that modicum of inaccuracy that enters into all communication. Here, as elsewhere, the dialectician has to make the best of facts as they are. In the sphere of scientific or factual communication we are no better off, as a consideration of the factual meanings of language will show.

Denotatively words direct our attention to something that is experienced and the results of experiencing give them their connotative meaning. To know what a thing is, is not merely to be able to select it from other things, but to be able to anticipate what will happen in various situations into which it may enter by virtue of the manner of its enterance. We summarize such significances of words in definitions, but unless we continually refresh ourselves by a reconsideration of experiences, there is always danger that our definitions may become petrified and loose contact with the actual character of what has been defined. It is not that truth changes, but that new truths must constantly replace old if language is to remain an affective instrument in dealing with things as they are. Enlarged activities require new truths. For a man merely wishing to take a walk the surface of the earth is a hill-strewn plain, but if he wishes to engage in commerce with the orient or to place the earth in its astronomical setting, he must acquire new truths about its shape.

The love of definitions is a perilous passion. An impulse of self-protection against the labors of readjustment often tempts us to resist or distort the lessons of new experiences, and makes us pretend to some sort of inherent knowledge of what words mean, a knowledge that can only be justified by assuming that somewhere, somehow, there has come to exist in the mind an ideal definition embodying eternal verities for all time. This is peculiarly easy since the constant fluctuation of the meanings of words is concealed by the fact that most of our dealings with our immediate surroundings are best furthered by a sort of abstractionism that selects from the richness of actuality only those aspects that are pertinent to the present problem. Everyday living generates routine uses of things to which only a few of their characteristics are relevant and which do not constantly expand our knowledge of them. No one, for example, is interested in the complex actuality of a chair. He may

care about its comfort-giving characteristics, its size, shape, weight, or artistic appearance. It is hardly possible that he will be led to consider its molecular structure, viscosity, or its opaqueness to X-rays. The word simply means something that can be sat upon when working, resting, dining, conversing, etc., and that is all there is to the chair as far as he is concerned.

For the scientist, however, the act of experiencing has a broader meaning. The basic process is the same, but his interest lies in noting the behavior of the thing in all possible situations. There is a great expansion of the range and subtlety of his contacts with things that results in constantly enriched meanings. Where most of us can pick out cats from the animals we happen to meet and satisfactorily place them under the category of possible pets or abhorrent nuisances, the zoologist must select them from the whole animal kingdom and distinguish them in terms of physiological structure and line of evolutionary descent. For the average man space is merely room to move about in and the source of place to put things, but for the physicist it is the condition of a highly complex and abstract system of measurements. Scientific terms are therefore peculiarly subject to constant fluctuation of meaning, and definitions are at once extraordinarily important and extraordinarily dangerous.

The whole upheaval of modern physics can be correctly viewed as the inevitable consequence of scientists refreshing themselves as to the meanings experience authorizes them to give to such terms as space, time, matter, motion, and the like, in view of recently observed phenomena and the more intimate contacts with physical reality that new methods of approach have rendered possible. Whatever may be the ultimate fate of Einstein's physics, his theories have a significant basis in a radically empirical recognition of the reinterpretations that must be given such terms as space, time, and motion in the light of the conditions under which we can find objective import for such words as line, length, simultaneity, and before or after. Bridgman's *Logic of Modern Physics* is a pioneer's effort to develop and extend this reinterpretation to all physical concepts.

A casual glance at the history of science is sufficient to show that this process of reconstructing meanings has always been going on. Matter did not mean to the Greek hylozoist what it meant for Democritus, nor to Democritus what it meant to the alchemist, nor to the alchemist, what it meant to Dalton, nor to Dalton what it means to the modern physicist. Euclid would probably have been puzzled at the use of the term "fourth-dimension." Each step in the advance of science involves a shifting of the meanings of words and the new meanings persist only until further experience renders

them inexpedient. Where previously believed facts are definitely discredited, words vanish, or retain merely historical interest, as is the case with "phlogiston." Where new facts appear new terms arise, as ion, electron, etc. More often gradual change transforms meaning; thus the word "dimension" has gradually ceased to denotate a characteristic of special experience and has come to apply to ranges of independent variables.

It might be an amusing dialectical problem to inquire whether a word that retains its pronunciation and spelling and functions relatively to the same region of experience but entirely alters its connotation is still the same word. But this is something akin to the problem of whether the jackknife is the same when its blades and handle are replaced. The non-dialectician would solve it as James solves the problem of going around the squirrel. It is often asserted that the communication of knowledge is only possible if words have fixed meanings. However, "poor, dear common sense," as Mr. Broad calls it, finds a way out of this difficulty as out of many others, in spite of occasional lapses into error. The situation may be well illustrated from the practice prevalent in law. To have no laws would be social chaos, as to have no meanings to words would disrupt communication. But, as every lawyer knows, social situations change so rapidly that laws must be constantly reinterpreted to keep pace. Judges make and remake the law with each decision. To save appearances, legal formulae persist; to preserve efficiency they are reinterpreted in the light of newly disclosed needs. Only when the discrepancy between need and formula becomes too glaring is a law formally wiped out or replaced by another law. So is it with the meanings of words, and the possibility of factual communication is preserved.

This situation is peculiarly fraught with danger for the naturalistic philosopher since the very nature of his subject compels him to acquire knowledge of the facts with which he deals through the language of scientists and not by direct contact with reality. He must try to understand the physical world through the language of physicists and the social world through the language of social scientists. Hence, getting the meanings of his words from definitions, he is prone to take definitions as finalistic, ultimate, and absolute, with the penalty that his philosophical structure, however beautiful from the logical point of view, relates to a world that can no longer be taken as the real world. This is why a philosophy really significant in its day, like that of Herbert Spencer, may rapidly become obsolete, and explains the fact that idealistic philosophies, since they depend more on inspirational value and emotionalistic communication, and less on the concrete interpretation of fact, have a greater measure of persistent vitality, than naturalisms. They

do not die from disclosed inaccuracies, but only from a shifting of aims and interests that makes them no longer appealing.

The status of naturalistic philosophies, however, is not quite so difficult as the obstacles due to the changing meanings of terms might suggest. They, too, are interested in promulgating attitudes toward life, and schemes of perspectives. Slight changes in the meanings of words such as constantly occur in the course of empirical investigations are not usually relevant to these broader purposes. Occasionally the emergence of a newly noted fact, like that of evolution, may necessitate a thorough-going reconstruction of them, but more often they persist until an accumulation of transformed material manifests itself, such as appears in the new physics. They are then held at bay until the new material can be assimilated and transformed for their purposes.

But our main problem is not fundamentally the difficulties of esthetic, scientific, or philosophic communication, although as an indispensable adjunct to the primary function of speech (the extension of our power of self assertion) the technique of communication in all its forms stands in the foreground. We need to recover the consciousness that factual communication is but a small part of our problem. Our social life is carried on mainly in terms of emotional communication and propaganda. American society is based on the assertion that "all men are born free and equal," but except as social attitude these terms have little meaning. Our politics and popular economics are shot through with catchwords that are loved rather than understood.

As a reaction, we pretend that education is concerned with the imparting of knowledge of fact, but actually no educator confines himself to this. He wants others to use his methods and accept his interpretations. Scratch his skin and you find a propagandist differing only from the popular propagandist in that his attitudes are based on a more thorough examination of relevant material. This should be so, for to divorce the esthetic from the scientific use of language would be to introduce an abstraction that would threaten the effectiveness the distinction was introduced to enhance. But a balance must be preserved between these two fundamental functions of communication. Where a too vigorous emotional setting is provided, the mere emotional element may induce an attitude of belief, a readiness to accept as basis of action, ideas ill-considered and not in accord with the actual situation. The opposition to free speech is motivated by a recognition of this danger. On the other hand, to impart mere factual analyses, except in situations where antecedent conditions contribute a background of interest, is to exhibit a cold scientific intelligence that can always be permitted the right of free speech, since it will generally fail to make the com-

municated facts live in the minds of its audience. It is the sort of communication that students accept for the purposes of passing examinations, but which leaves no further traces in the conduct of their lives.

Again, "poor, dear common sense" must find a mediate course. It must bring together in practice what theory keeps apart, but it is well that it should be conscious of what it is doing. We do not want blind propaganda or ineffective ideas. Language is an instrument to facilitate the process of living and living is not a conjunction of thinking, feeling, and acting, but a complex activity whereof these three processes are but analytically distinguished phases. The whole is not the sum of its parts but a whole of which the character can be better grasped through considering it as a synthetic unity of them.

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THE PROMISE OF PRAGMATISM

THE conviction grows upon me that pragmatism might have had and still may have a more fruitful influence on philosophical thinking than it has yet enjoyed. As itself a philosophy, it is now more a memory than a force. It is referred to more frequently than it is celebrated. Many of us have become pragmatists in one sense or another, but few of us claim to be pragmatists in the sense that we have found in pragmatism a philosophy of human living, a theory of knowledge, or the key which unlocks the mind. It looks, indeed, as if pragmatism had taken a comfortable and respected place among those intellectual enthusiasms which have historical as distinct from permanent or progressive interest. The reason is not hard to discover. Pragmatism originally appeared as an attractive name for a method of clarifying our ideas, "a new name for some old ways of thinking," as James himself phrased it. Ideas, we were advised, can be clarified by finding their meaning in the procedure in which they are employed. We were cautioned against meanings independent of procedure or supposedly antecedent to it. Arbitrary definitions were to confess the fact that they were arbitrary and were not to be allowed to encourage dialectic when it was out of place. Freedom and flexibility in thinking, the habit of seeing how ideas are generated and modified by following the lead of subject-matter, an analysis of how our thinking operates as it passes from station to station in its progress—such as these were the aims which pragmatism professed to further. There was promise in it. This promise was speedily put into a position of minor importance. Pragmatism became a controversy about the nature of truth. Instead of encouraging an-

alyses of the meaning of terms and ideas in the contexts wherein they occur, it encouraged a debate about the foundations of belief and the criteria of truth and falsity. How can we determine when our ideas are true, became a more important question than how can we determine what they mean. The promise of pragmatism had, except in rare instances, little illustration of its fulfillment. It remained, for the most part, expressed in very general terms, a hope, an aspiration, a piece of advice, but found little expression in terms of specific analyses of procedures applied to varying subject-matter.

The reasons why pragmatism became a controversy may be left here unconsidered. The fact is probably more important than the reasons, for the controversy diverted attention from what was fruitful to what was fruitless. It led to antipathies between minds which were, ordinarily, not antipathetic. The combatants convicted each other of nonsense although they otherwise respected each other. They said in their haste what they probably would not have said at their leisure. It has to be admitted, I think, that "truth" is essentially a controversial matter. What is truth? Those who stay for an answer are pretty sure to stay for a quarrel. Pragmatism tried to alter the question, to ask instead for samples of truths or for a consideration of the adjective rather than the noun. But unhappy and unfortunate phrases got in the way. The slogans of pragmatism were perilous. When it was claimed that an idea is true because it works, the rejoinder was ready and well-nigh inevitable that an idea works because it is true. "Working" was something that had to be defined, but the best of definitions never seemed competent to settle the question whether truth was the consequence of working or working the consequence of truth. Undoubtedly there is something suspicious about any identification of the truth of ideas with their effectiveness either in discourse or experiment. It would seem that the effectiveness must be of a particular kind. And that particular kind, when it takes on an adjective to qualify it, always seems to clamor for the adjective in dispute. Beliefs are obviously effective when they are not true, and no "long run" of their effectiveness seems adequate to remove them from suspicion. So long as the qualification of effectiveness must be the true qualification, it is difficult to find another adjective which will do as well, even if the dear adjective is elusive. It ought not to be said that the opponents of pragmatism were successful in removing that elusiveness. To equate truth with consistency or with the agreement of ideas with objects, was as perilous as to equate it with effectiveness, especially when a pragmatist was one's opponent. There were nasty questions to answer. How are ideas found to be consistent? How are they found to agree with objects? The answer seemed to be: Is prag-

matism true because it works or does it work because it is true? The answer was, in other words, to renew the controversy. There was not settlement of it. It wore itself out. The unfortunate consequence was that it left pragmatism to be remembered mainly as a controversy, a debate, brilliant at times and at times bringing with it matter of importance, but a debate without an issue. Tired of trying to tell what truth is, the combatants turned to a more promising occupation, that of trying to tell what other things are.

I would not say that pragmatism was nothing but a controversy. Rarely is anything nothing but. I am saying rather that its effect was controversial and predominantly so. It provoked dissent, and that provocation obscured its major contention. Instead of leading to an embrace of its promise, it led to a contention about irrelevancies. I think this can now be said. Pragmatism, as a way of thinking, had no more and no less to do with truth than any other way. These ways are known by their fruits—a remark which sounds like a pragmatic slogan—and their fruits may be truth incidentally, but they are, first of all, clarifications of the procedure of thought. They may clarify that procedure to a point where the question of truth becomes pertinent, to the point where questions find or do not find answers which answer them. The clarification is primary. And clearly it was primary in the claims of pragmatism. Moreover the claim was not of the kind that can be settled by debate or by considerations in general. The question, whether the claim that the method of pragmatism can clarify ideas is a true claim, could be answered only by finding out whether the method did or did not. There was no other possible answer and the answer was bound to be in specific cases, final. In no other sense had truth anything to do with the matter. The important thing was the way of thinking recommended. Its importance was discovered by trial and should be evaluated by trial. In this respect, pragmatism was anything but a controversy. It was a recommendation to experiment. Rarely did it happen, even in those controversial days, that that recommendation, when studiously followed, was fruitless. It is worth recalling what the recommendation was.

It was not of something new, but of something readily and often habitually forgotten, and of something, too, of which the need of a reminder seems to be periodic. It was the recommendation to remember that whatever meaning an idea may have independent of a given context, it has a discoverable and often an altered meaning in that context. Consequently it is clarified by discovering the way it operates in the context given. Pushed further, it was the recommendation to remember that although an idea may always have the same meaning in every context to which it is relevant, it has no

meaning at all apart from any context. Pushed still further, the recommendation may turn into a dogma. Pragmatism, as I understand it, claimed or certainly seemed to claim, that apart from operation in discourse and experiment, ideas not only have no meaning, but are non-existent; and that, consequently, the function of ideas is not to represent, stand for, or duplicate objects in some way, but to mediate the processes of discourse and experiment. If I am not mistaken, it was this dogma which was the prime motivator of the controversy which ensued. As I do not wish to revive the controversy, I leave the dogma without other comment than this: It is a dogma which might very appropriately submit itself to pragmatic analysis. Much obviously depends on the meaning of "idea."

Pragmatism, then, recommends that we think in terms of what we do: that we think of measures in terms of measuring, of values in terms of evaluating, of ideas in terms of the way they operate. The recommendation was timely when it occurred. It afforded a needed stimulus to a reconsideration of philosophical ideas and problems which persisted more because of the historical momentum they had acquired than because of their clear relevancy to contemporaneous inquiry. At the lowest estimate, it afforded a rigorous and interesting diversion, in response to which much that was old was considered anew. Its appropriate estimate deserves to be made in other terms, in terms, namely, of its repeated application. Its claim to be able to clarify ideas is, as I have said, a claim to be tested, not by discussion, but by trial. What, for example, did Euclid mean by a point; or, if one will, what was his idea of a point? He defined a point as "that which has no parts." Is this a direction to try to think of something that has no parts? Is everything that has no parts a point? Is a point something physical or conceptual? Is it something concrete or abstract? Is it real or ideal? Is it something found or something assumed? Students of geometry are familiar with such questions as these and with controversies arising from them. In contrast with these questions and controversies, we may ask the pragmatic question: What is a point in Euclid's procedure? In that procedure, what is it that has no parts as over against other things in that procedure which have parts? Then an answer seems to come of itself. Euclid meant by a point, first of all, the ends and intersections of lines. Other meanings, as of "a point above a line" or of "a point without a circle" seem to be derivatives of the original meaning. Now the ends and intersections of lines do not have parts in the sense that lines and what is made up of them or inclosed by them have. A line can be divided, but the end of a line can't. Euclid's definition does not clarify his procedure, but his procedure clarifies his definition. With the definition so clarified,

one is not likely longer to debate whether a point is abstract or concrete, ideal or real. Indeed, there are many controverted questions which one will then no longer debate. A similar clarification of other definitions and the application of pragmatic analysis to Euclid's procedure generally, have a similar effect. Clearness of a definite and genuine sort is attained.

In an example like this, there may remain the question—and a similar question may remain in similar examples—whether a point as clarified in terms of Euclid's procedure is a point as Euclid conceived it in his own mind or as it ought to be conceived in any mind. An answer to this question seems to me to be irrelevant to the value of pragmatic analysis. Nor can that analysis answer it. But it is in just these considerations that the merit of the analysis is discovered. To turn it into a means of revealing hidden thoughts or into a metaphysical determination of absolute meanings, is to distort it. The important thing is that ideas, concepts, categories, definitions and the like, no matter what meanings may be given to them independent of their use in the exploration of some subject-matter, have a discoverable meaning in every such exploration. They have a meaning when they are at work which can be discovered from the way they work. Example after example can be given. Chance, for instance, is a troublesome category. To define it first and then seek for instances which the definition covers, involves a very ambiguous performance. It is easy to say there can be no such thing as chance. It is easy to affirm that its recognition is a consequence of ignorance. Yet when chance is used as an operating category in the various fields where it is employed, it has a discoverable meaning which rarely permits us to say there is no such thing or that the recognition of it is due to our ignorance. Multiplying illustrations of the pragmatic meaning of ideas is some revelation of their character. Let us believe, if we want to, that in themselves they are as absolute as any ardent Platonist could wish, with fixed and unalterable meanings which we labor to discover, pragmatic analysis can still convince us that when they appear in discourse and experiment, they have a working meaning. They expose themselves in connection with very concrete performances and lead our thought on to very definite implications. Seen in the light of the procedure in which they are involved, they gain in precision, definiteness, and effectiveness. Our understanding of the subject-matter about which they are employed is heightened. The merit of pragmatic analysis lies in its freedom from those entanglements which arise when ideas are otherwise analyzed and defined.

The illustrations given, sketchy as they are, seem to me to be a clear indication of this merit. The controversies to which prag-

matism gave and may give rise in no way affect the advantage gained by analyzing the meaning of ideas in terms of the procedure in which they are involved. Meanings derived from context are as genuinely meanings as those derived in any other way. They operate and there are discoverable consequences of their operation. They often become controlling in the progress of an inquiry. They often lead thought to conclusions which can not be understood unless in terms of their operating meaning. We are, as a consequence, repeatedly confronted with statements, conclusions, and beliefs which mean one thing in their own context and quite a different thing, or nothing at all, when transferred to another context. The pragmatic analysis is pretty sure to bring relief in this situation. It is an old way of thinking in the sense that logic anciently advised thinkers not to mix up their universes of discourse. It is new, with a new name, whenever the need of its exercise becomes significantly recognized. Its need seems to me to be eminently evident. The outstanding illustration is the rapidity with which ideas have been shifting in our theoretical interests and particularly in the field of physics. That there is abundant confusion needs no proof and that this confusion is largely due to contexts in rivalry, is evident.

When, for example, Professor Whitehead writes: "The most successful example of community life exists where pure instinct reigns supreme. These examples occur only in the inorganic world; among societies of active molecules forming rocks, planets, solar systems, star clusters,"[1] a reader, like myself, may be pardoned if at first he wonders whether Professor Whitehead is writing nonsense or poetry. The wonder might be dispelled by application of pragmatic analysis. I might be brought to see that Professor Whitehead is writing neither. When the possibility is suggested to me by Professor Eddington[2] of sending out messages tomorrow and receiving the answers today, I am at a loss to know whether to laugh or to cry. The laugh, I guess, was expected, but could not one cry if the best physics can do is to give us the prospect of a world so bizarre? If there is sense in it, I can see no other way of finding it than by pragmatic analysis. What, in the procedure to which Professor Eddington is committed, is the meaning of "messages," "today," and "tomorrow"? So long as I can not make that out, the book is no more illuminating to me about the physical world than is the "Shaving of Shagpat" about a barber-shop. Again: in terms of my habitual ideas, it is quite conceivable to me that, when measured, I shall be found to be shorter standing up than when lying down; but I can not conceive this if, at the same time, I am expected to admit that the rod which measures me is of different lengths in different positions. If I am

[1] *Symbolism*, p. 62.

[2] *The Nature of the Physical World*, p. 57.

six feet lying down and five feet ten standing, then the rod which measures me must, when measuring me standing, extend two inches clear above my head. I can readily suspect that when either the rod or my body is turned from a horizontal to a vertical position, something happens to it which should seek expression somehow in terms of measurements of length, but if I am to be clear about that somehow, it is useless for me to follow the lead of my habitual ideas; I must find out by pragmatic analysis what "differences in length" mean in a procedure which claims that a rod is shortened when it moves in the direction of its own length. What is "its own length"? What is it to "move in the direction of its own length"? What is it for "its own length to be not so long when moving in the direction of its own length"? How can a rod have a length of its own? If it can not have such a length, how can moving it in that direction shorten it? If its length is its length in a context, what is it that is shortened in another context? My habitual ideas are of little or no help in trying to answer such questions. In terms of them, these remarkable new ideas about the rod are simply silly. I can not, however, believe that they are silly simply because I do not understand them, any more than I can believe that this article is silly if some dear reader fails to understand it. My trouble—and the dear reader's—is an invitation to try pragmatic analysis.[3]

My trouble, however, leads me to say with conviction, even if the expression of this conviction sounds extravagant, that many of the recent attempts to make clear to what is called "the intelligent reader," new ideas about space, time, motion, mass, matter, etc., are misguided and essentially unintelligible. They seriously raise the question whether the authors are clear in their own minds. They are misguided because what their authors have to say about space and time can not be said in terms of the space and time with which the intelligent reader is familiar. His space and time definitely belie what is said about them. To be sure, it may be replied; for what is said is said not about *his* space and time, but about *the* space and time of the physical world; he ought to be intelligent enough to see this. I reply,—he is. He is also—I venture this—intelligent enough to see that many of the illustrations, and often the crucial illustrations, that are given to him to help him understand, are illustrations in terms of *his* space and time and not in terms of *the* space and time of the physical world. That is why he suspects that those who offer the illustrations are themselves a little confused. He knows that t may be $+t$ or $-t$ or t^2 or t^{-1} or even πt, but he knows also that yesterday, today, and tomorrow are not matters of

[3] I can readily believe that the Fitz Gerald contraction is real, but like Professor Eddington, I want to know in what context it is real and what it means to be a real contraction in that context.

this kind. He knows that things look different from different points of view, but he knows also that he can not see how an observer who sees an elevator with its mechanism carry him to the top of a building can construe that ascent as the building going down. The building may be going down and he not know it, while the observer does, but that is not the difficulty. The difficulty is the elevator. The intelligent reader strongly suspects that the observer is seeing him carried up in an elevator in a building which is going down. It may justly be said that such illustrations as are here given ought not to be used. The fact is that just such illustrations are used. They promote confusion instead of clearness. They create the suspicion that there is confusion in the minds of those who use them.

The passage in thought from the world of yesterday, today, and tomorrow and from the world in which we go up and down, in which we go here and there, and in which we do one thing at the same time another does another thing, the passage in thought from this world to the physical world is a difficult passage. I doubt whether all the strange behavior of clocks and rods to which attention has been directed has made that passage clearer than it was before that strange behavior was promulgated. The very fact that we speak of the *physical* world ought to warn us that the ideas which go to make it up ought to be made clear, not by illustrations drawn from another world, but in terms of the procedure which is employed in discovering the physical world. In this way alone, as I see it, can we hope to reach a position from which the passage in thought to the physical world can itself be made clearer. I have no doubt at all that there is the physical world, or that explorers of it are saying, even when they say things very strange to me, relevant things about it. I believe it is a world without which nobody could be born or die. But it is difficult for me to believe that anybody either is born in it or will die in it. Without it, the sun could not go round the earth, nor the earth go round the sun. In it, neither does either. But I should have to use pragmatic analysis to make these unintelligibilities clear.

Of all the recent books I have read which have been written for the intelligent reader about the physical world, I like Professor Bridgman's the best.[4] It impresses me as having rendered a great service in helping to make ideas clear. It uses pragmatic analysis. I hope I do not misrepresent it when I say that I learned from it that when we speak of the distance from the earth to the sun and take into account how that distance is arrived at, distance does not mean quite the same thing it means when we speak of the distance between the top and bottom of this page and take into account how this distance is arrived at. With this lesson learned, I thought I saw quite clearly that the distance between bodies at rest, the di-

[4] *The Logic of Modern Physics.*

stance between bodies in motion, the distance between opposite sides of a street, the distance between the earth and the sun, the distance between the Battle of Marathon and the Battle of Bull Run, the distance between a note and its octave, the distance between white and black, and the distance between good and evil, might all be distances but that *distance* was probably distance between nothing at all. As an historian, I sensed at once the age-old distinction between the universal and the particular, but under Professor Bridgman's influence, I sensed it in a fresh way. I was not at all ready to deny that there is such a thing as *distance* which is not a particular distance. Logic had taught me that *distance* can not be a particular distance, that *distance* can not be *the* distance between the earth and the sun. And I have never been able to agree with those who would, therefore, deny being to distance or those who try to explain it away by some psychological juggling. I suspected Professor Bridgman of saying that there may be a formula for distance which is neither the distance between opposite sides of a street nor between the earth and the sun, but from which both these distances, when the proper transformations are made, can be derived. I had long suspected that there might be such a formula, because I had been taught that from $D = \sqrt{x^2 + y^2}$ one could derive either the side of a square or the circumference of a circle and that the formula was also a formula for distance. If I could derive from it or from something like it the distance between the earth and the sun, perhaps I could also derive from it the distance between two events like the Battle of Marathon and the Battle of Bull Run. Why not then go on to good and evil? Everything pointed that way even if I could not follow. Since, however, x and y could be anything and could be held together in such a way as to yield such different things as distances, squares, circles, sines, and roots, why should it not yield much besides? And it seemed quite clear that the more it yielded the less it would be anything it yielded. In fact it would never be anything it yielded. In yielding the distance between opposite sides of a street, it was never that distance. If it yielded good and evil it would never be good or evil. So the distinction between distances and what can yield distances by some operation or other seemed clear to me. There was concrete illustration of it, and, I thought, quite unequivocal illustration. It was an easy jump to the physical world —at least it seemed easy. The physical world is that which can be so formulated as to yield with the relevant operation a man's birth or death, but, obviously, in that world he neither is born nor dies, any more than the distance between the earth and the sun is in the world of $\sqrt{x^2 + y^2}$.

But I had not intended to air my ideas—or the ideas to which

my reading has led me—about the physical world.[5] What I have said may be taken as some further illustration of pragmatic analysis. By the use of that analysis in a variety of cases, it has become increasingly obvious to me that the physical world is a discovery and a discovery which can not be identified with that out of which it is discovered. Professor Eddington's two tables confront me. There

[5]The "physical world" is an ambiguous expression, as one can readily detect by putting "physics" and "physiology" side by side or by reflecting on a current demand that "physiology" should be more "physical." The adjective "physical" has not kept a tight and uniform meaning throughout its history. The "physical world" once meant, among other things, the world to which "physics" is relevant. "Physics" has come to mean, among other things, the systematic measurement of that world. In systematizing the measurements, it would seem that another world has been discovered which is coming to be called, more and more restrictedly, "the physical world" or "the world of physics." The "world of physics" may be that without which nothing can be measured in a coherent and systematic way; but is it anything that can itself be measured? Can *the* measure be measured? Is not an identification of *the* measure with what is measured a source of much current confusion? Is not an identification of the "world of physics" with the "physical world" made again and again without sufficient analysis of the meaning of the terms which mediate the identification?

Take this for example: "The speed of 299,796 kilometers per second which occupies a unique position in every measure-system is commonly referred to as the speed of light. But it is much more than that; it is the speed at which the mass of matter becomes infinite, lengths contract to zero, clocks stand still. Therefore it crops up in all kinds of problems whether light is concerned or not." Am I quite foolish—thinking of some kinds of problems—if I wonder if my clock is now going with the speed of light because it has stopped? Of course, I know it is out of order and so has stopped. I shift my wondering: if my clock were not at all out of order and should stop, would it be going with the speed of light? Could it go with the speed of light and stand still, with the mass of matter become infinite and lengths contracted to zero, and still be a clock and my clock at that? I can't believe it. Yet I can still believe that "the speed of light" occupies a unique position in every measure-system. Indeed, I could even venture into the realm of pure rationalism and say: since light is essential to every measure-system, the speed of light *must* have a unique place. I find it, however, very difficult to believe that the speed is 299,796 kilometers per second if at that speed lengths—kilometers?—contract to zero. In short, it is easy to believe in the world of physics, but difficult to believe that it is the physical world. How comparable—and in what way comparable—are masses, lengths, and times in the world of physics with clocks, kilometers, and seconds in the physical world? How do we pass from the latter to the former? Surely not by making the behavior of the latter unintelligible. Nor, as I see it, do we need a theory of knowledge to help us out. The passage is made. It is made by doing certain very definite, repeatable, and learnable things. It involves a procedure. We need pragmatic analysis of it, and in detail. This we need far more than expositions which try to tell us what the world would look like if we travelled with the speed of light, if we observed it under conditions under which it could not possibly be observed. If there is a world impossible of observation, it ought not to be exploited in terms of observation, even if it is by observation that we are led to it.

is a table which can be so explored that the explorer is led into the physical world to discover there something which may also be called a table when we keep in mind the manner of its discovery, but which, independent of that manner, would never be called a table at all. The physical table is not the table with which we start, but the table at which we arrive. It is not the beginning of an exploration, but the end of one. The evidence for this seems to me to be too strong to be refuted. The table with which we begin has been familiar for centuries; the table with which we end has taken centuries to discover and may not be the table we discover next week. Yet the fact that we continually discover a second table is good proof that a second table there is. We might stop here. We might even generalize the matter. We might say that by exploration of a world constantly familiar we are led into another world which is not constantly familiar, which changes in familiarity with our explorations, in which, however, we confidently believe. We might, I say, stop here. Pragmatism would advise us to stop long enough, at least, to become quite clear about the situation, to be quite clear that it is a solid outcome of procedure even if it may not be the final outcome. The table we write on, when explored, leads to the discovery of a table to which writing on is quite irrelevant as an expression of what it is. That's a good place to stop and get accustomed to before going on, because it is so solid and so uncontrovertible. The fact that when we go on, we so frequently fall into controversy and say things astonishingly strange and often so difficult to believe, ought to fill us with supreme caution. One of the commonest things we are apt to do when we go on, is to say and try to believe that the unfamiliar table is prior to the familiar table. In spite of the fact that the unfamiliar table has no discoverable precedence, we often make it precedent and look upon the familiar table as its disguise. Were it not for the garb which the unfamiliar table wears when we see the familiar, we should see the unfamiliar table! This may be true, for it is a mighty curious world in which we live. I can not believe it, however, and for several reasons. Some of them may be personal, others, I think, are not. A personal reason is that if I believed this, I could believe almost anything; few beliefs would impress me as quite unwarranted. Among others reasons is this: every attempt I have made and have found made by others to deal with these tables in terms of priority, results in a controversy. Bias for the unfamiliar table turns the familiar into something called appearance, and bias for the familiar turns the unfamiliar into a convenience for the imagination or practice. Each of these positions becomes a matter of debate, and yet each is discredited by any test which is relevant to a trial of them. If the appeal is to experience, then experience robs neither table of its genuineness. More emphatic

still is the reason that the unfamiliar table is discovered by dealing with the familiar one. So I must take both tables as equally genuine. But I can not take the discovered table as identical with the table from which it is derived. Making them identical seems always to lead to saying about the familiar table what is said about the unfamiliar, and this results in something paradoxical and bizarre. If I identified them and were sensitive about it, I should be sensitive about moving my familiar table about even if I am advised that it is not big enough or small enough to be seriously affected by the changes going on in the unfamiliar table. No: I must, at least pragmatically, keep my two tables from merging into one, if I am not to lose either them or sanity. This may not be the end of the matter, but it seems to be the beginning of anything subsequent that matters.

There should be, I suppose, a conclusion to this article. But its conclusion would be its point, namely, that pragmatism held out the promise of helping to clarify our ideas and that promise has been too much obscured by the controversy which made of pragmatism a debate about truth. The debate may never be ended, but the promises can be fulfilled; at least, whether it can be or not, is a matter of trial. The trial seems to be poignantly recommended when rocks become social, when clocks and rods behave remarkably, and when religion is encouraged by exploration of the nature of the atom. What do all the new ideas mean? It seems useless trying to define them in terms of old ideas. They need definition in terms of their operation in discourse and experiment. One can not begin with space, time, and matter, or with ions, electrical charges, and space-time. One has to begin with something else, with definite concrete operations, often with laboratory experiments, and, following them out, find out what the new ideas mean as revealed in and by the procedure. Until this is done, there is no use in asking whether the new ideas are true. Pragmatism may never arrive at truth, but it can minimize confusion. If my illustrations have not illustrated this clearly, the fault is mine, not the method. The more the method is tried in specific and limited cases, the more likely is it that we shall be clear in our dealings with cases at large.

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BOOK REVIEWS

Poetry and Mathematics. SCOTT BUCHANAN. New York: The John Day Company. 1929. Pp. 197.

In this book, as in his *Possibility,* Mr. Buchanan comes to close quarters with the problematic relation of essence to existence. The contrast between the intangible, relational character of the world as

revealed to reflection, and its immediate, qualitative aspect as given in sense perception, has been ever a challenge to philosophers to build systems. Mr. Buchanan has no system or a fully formulated solution to offer. An attempt to discover what mathematics is about led him to examine the nature of poetry as well, and to note certain similarities between them. What he has found he believes can add to our understanding of current science and literature.

His thesis is very simple, although in spite of the great beauty of Mr. Buchanan's diction, his argument is not always easy to follow. His words are drenched with meanings which call to each other in a way often to confuse the reader, and the terseness which he favors in mathematical proofs is a quality he himself possesses to the detriment of some clarity. Mr. Buchanan's thesis is this: Poetry and mathematics are both successful enterprises in the realm of ideas. Although both use symbols and notations, possess a technique, and find illuminating applications in science and morals, none of these features is of their essence. Their essence is to be something intellectual, to operate in terms of clear vision, and to rest in the envisagement of intelligible relational structure. Order, variation within this order, and hierarchies of such orders and variations is the subject-matter of both. "A demonstration uncovers a figure in transformation just as a poem reveals a character in action." However, there are certain differences between them. The mathematician is interested primarily in relations, while the poet's interest is quality. "Mathematics is analytic, seeing wholes as systems of relations; poetry is synthetic, seeing wholes as simple qualities."

But Mr. Buchanan has another, a more "malicious" thesis. The ideas which he loves in their purity, obtain his homage only on condition they remain pure. Just because they are something intellectual, mathematics and poetry can not render the characters of things. To ascribe the relations which are subject-matter for the mathematician to things, except perhaps as a way of speaking, as a metaphor, constitutes for Mr. Buchanan the cardinal sin: one then indulges in belief and practises magic. And so it turns out that "it is difficult, if not impossible, to distinguish between applied mathematics and astrology, alchemy and the occult arts" (p. 11). If Bradley found that he could not affirm without contradiction that sugar is sweet, Mr. Buchanan finds it impossible to believe that the answer to the question "how much?" can be, literally, "five pounds." Since all our commerce with existence involves a transfiguration of it because of what the "whimsical universe of ideas" does to our experience, discourse can never reach over into a realm that is not discourse, so that it is only analogically that ideas are ideas of things. "Science is an allegory that asserts that the relations between the parts of

reality are similar to the relations between terms of discourse" (p. 104).

This sharp bifurcation of the universe into things whose mutual relations are out of discourse, and terms in discourse whose mutual relations stand over against the relations of things, Mr. Buchanan attempts to justify by an analysis of the application of mathematics to existence. Now every philosophy of mathematics must meet two conditions: it must give an account of the "non-existential" character of mathematics when taken dialectically, and it must give an interpretation of the success of this dialectic in dealing with existence. Mr. Buchanan does not succeed in doing the latter without a paradox, a paradox to which he is bound by his theory of relations. For his relations, as did Bradley's, have an unusual disability to perform their work, a disability arising from taking relations as identical with their *formulation in discourse,* and therefore as substantiated or reified. No wonder one can find no such relations in existence! How much of Mr. Buchanan's argument (as does Bradley's) hangs on a verbal trick is clear if we paraphrase the definition of scientific law quoted above into: "A scientific law asserts that the relations between the numerical characters of things are identical with the relations between numbers." When one attends to the relations rather than the words which express them, Mr. Buchanan's argument is not even persuasive.

Mr. Buchanan agrees with the accepted doctrine that the essence of mathematics is logic, and shows how to build up the number system in logical terms. But the nature of this logic is never exhibited, so that while there is a nominal denial that symbols constitute the nature or subject-matter of logic, in his exposition he never looks beyond them. For example, an "operational" definition of numbers (i.e., counting) is given as follows: "A point of beginning is assumed, usually the number one. An operator, so called, is also taken. This operator is called $+1$. Then follows a process of intellectual knitting starting with $1+1=2$, $2+1=3$, . . ." (p. 54). Counting, one usually supposes, is a counting, not of numbers primarily, but of individuals of some sort; these may be numerals, symbolic of other operations. It is sheer confusion to suppose that numerals are numbers. The formulation of operations or relations is certainly not the subject-matter formulated; is there any reason, however, to doubt that the formulation expresses it? Had Mr. Buchanan taken as his point of departure for analysis the process of counting or measuring as performed in some existential science, rather than a logic whose bases are hidden and whose roots have no place in existence, it is safe to say he could not have found that applied mathematics is such terrible magic. As it is, Mr. Buchanan

does not like the class definition of cardinals because individuals must be assumed to be counted. He prefers an ordinal approach to cardinal, overlooking here, too, that there must be individuals to be ordered.

The important chapter for Mr. Buchanan's thesis of the radical dichotomy between discourse and existence is the one on proportion, since he finds it necessary to prove that every proposition contains an analogy in some form. This is, the reviewer believes, an unexceptionable statement, if one adds that elements of identity or literalness must be present as well. If knowledge is regarded as a process, it begins with a metaphor not recognized as such, although it moves toward the elimination of features that are merely "like" in some vague way, and arrives in its finished product at what is identical. It is about this identity that Mr. Buchanan raises doubts.

To win his point Mr. Buchanan discusses the principle of the lever as expressed in the form of a proportion. In order not to dilute its flavor the discussion is reproduced in full.

> It will be best to point out that it is the result of two apparently unjustified leaps of imagination. . . . A double leap it is, and the reader can supply whatever theory of revelation, reincarnation, or conventional fiction he prefers, to account for it.
>
> To say that $W_1 : W_2 :: D_2 : D_1$ is by itself ambiguous. Perhaps it only means that certain numbers stand to each other this way: 2 :4 :: 3: 6. In that case it is merely a happy discovery in arithmetic. But W stands for weight and D stands for distance. It may therefore mean that the relation between two weights is the same as the relation between two distances. But this is not true for many relations; for instance, 'heavier than' is a relation between two weights, but not between two distances. The only relation that works is a hybrid combination of these two.
>
> The combination is evidently derived from two previous proportions, namely: $W_1 : W_2 :: 2 : 4$ and $D_2 : D_1 :: 3 : 6$. Then because we already know in arithmetic that 2: 4 :: 3: 6 we can finally see how it is that $W_1 : W_2 :: D_2 : D_1$. But why weights and distances are like numbers, to use the simile, has still to be explained. The only answer that I know is that some poet of the commonplace was playing with words, and somebody took him literally [p. 90].

Mr. Buchanan can not pretend to be reporting here the history of the discovery of the principle of the lever. As a deduction or validation of an important numerical law, however, it merits a conspicuous place in some future Budget of Paradoxes. What is commendable, is Mr. Buchanan's restraint from giving demonstrations of many more things, although as an example of what might be done one can suggest the proof in the *Euthydemus* that a dog was the father of Ctesippus and its puppies his brothers. Mr. Buchanan's difficulties seem to arise partly from his dogma that numbers can not be the numbers of anything without losing caste, and partly from the failure to realize that in the statement of the law at least two relations are symbolized. In the first place, the relation $W_1 : W_2 ::$

2:4 can be intelligibly interpreted as meaning that four weights each equal to W_1 are equal to two weights each equal to W_2, where "equal" is defined in some unambiguous way. Secondly, it must be observed that the *symbol* :: stands for both a *numerical* relation between numbers assigned in the way suggested, and a *physical* relation into which the lever enters in a very specific way. The proportion as it stands expresses *two* sets of relations, and we can use the same *symbol* to represent both because the relations have certain formal properties which are *identical*. Numbers are not *like* weights, indeed, but numbers are, and numerals express, definite properties of weights. Mr. Buchanan's great sin is to compare the statement of a relation with the relation itself. If discourse can not be literally compared with what it is about, is it not wisdom to recognize that discourse expresses it?

Suppose, however, that we turn the dialectic upon Mr. Buchanan. If "is like" is to be substituted for "is" as he insists (p. 81), how are we to understand him? Is his book, too, a metaphor? When he tells us that applied mathematics is a metaphor, are we to understand that it is only *like* a metaphor, but not quite? On his own premises, on pain of endless regress, can he say more than that "applied mathematics is—applied mathematics"? Discourse, too, is subject-matter for further discourse. Do we never get the essence of the first discourse in the second?

If there is no sense in which there is an identity between idea and object, how does he explain the peculiar "working" property of some analogies, especially their power to predict? Why should some analogies stretch and break? If existing things do suggest forms to us, is it not perchance because the things themselves possess them? And does not Mr. Buchanan himself declare (or is it a slip) that it is subject-matter which controls practice in style (p. 140), and that we may possess the forms of things (p. 163)?

The untangling of threads of similarity running through the literature of Greece, medieval Europe, and the contemporary era which Mr. Buchanan has achieved so bewitchingly, is a glorious exhibition of sympathetic interpretation and perception of a constant "propositional function" in different values of it. But the conviction grows on the reader, even though it is the old Adam prompting him, that the discovered similarities indicate a structure that is ontological in character, and not a mere pattern of discourse with no roots in existence.

A number of less important objections remain to be noted. (1) A figure is defined in geometry as that which retains an identical character throughout a series of possible transformations (p. 26). Mr. Buchanan makes much of this to show that mathematics deals

with intangible relations. He never tells us, however, what it is that the "transformations" (which he seems to take literally, cf. p. 37) do transform. As a matter of fact, his use of "figure" is highly ambiguous. As defined, it is something which is not necessarily spatial or visual, as an anharmonic ratio is not; but he calls "figure" the picture one gets in the operation of "cutting" cones (p. 35), even though the pictures are here the variables or "transformed" things. Indeed, one suspects it is because he slurs over the distinction (which is quite fixed in a definite context) between the two uses of "figure" that he makes his case plausible for the disappearance of terms which do stand to each other in related ways. Furthermore, invariants and possible transformations are strictly correlative and symmetrical concepts: if we fix the figure we thereby define the permissible transformations, if we fix the transformations we define the figure. (2) Why does Mr. Buchanan find that the figures of metric geometry are arbitrary termini, "paradoxical if taken by themselves, but intelligible enough if understood as stages in a projective development"? The fixities of projective geometry are only "points of rest," too, in a topological treatment. (3) Is it quite fair to declare that what is worth discovering in mathematics "does not need proof"? In eschewing deduction and extolling "insight" Mr. Buchanan's theory of mathematics is a puzzle to one reader at least. (4) How is the assertion (p. 92) justified that acceleration is really a ratio between two velocities? The statement that according to Galileo the velocity of a falling body is proportional to the square of the distance, is a slip. (5) In identifying the cardinal number 5 with the rational number 5/1 (p. 56), the chapter on number is difficult to follow. It is not true that every function can be integrated (p. 159).

A remark on Mr. Buchanan's growing scepticism will conclude this ungracious review of a very delightful book. In his earlier book the criticism of science and discourse was based upon the distinction between validity and adequacy; discourse could be valid in its dealing with actuality, although it could not be adequate. If this reviewer understands him, Mr. Buchanan doubts the validity which he once granted.

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JOURNALS AND NEW BOOKS

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SCIENTIA. Vol. XLVI, N. CCIX–9. Lo sviluppo delle matematiche pure durante il secolo XIX. Parte IV[a]: L'analisi matematica. Dalla teorie dei numeri all'assiomatica e all'automatica: *G. Loria.* Waves or Particles?: *G. P. Thomson.* Der heutige Stand des Entwicklungsproblems. II. Teil: Neuere Anschauungen und die Zukunft der Entwicklunglehre: *L. von Bertalanffy.* Da la nécessité d'une entente et d'une organisation économiques internationales: *H. Sée.*

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Wright, Benjamin Fletcher: A Source Book of American Political Theory. Edited with Introductory Notes. New York: Macmillan Co. 1929. xi + 644 pp. $3.75.

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Section 1: Can science dispense with the notions of substance and cause?

Section 2: Is a philosophy of history consistent with the facts of history?

Section 3: Must biological processes be either purposive or mechanistic?

Section 4: The relations between metaphysics and religion.

DIVISION B. *Logic and Epistemology*—General Session: The value of recent contributions to logic or phenomenology.

Section 1: The nature of perception and its objects.

Section 2: The nature and source of non-perceptual factors in thinking.

Section 3: The relation of scientific thinking to the ideal of knowledge.

Section 4: Is probability objective?

DIVISION C. *Ethics, Politics and Esthetics*—General Session: The value of ethical and political philosophy as guides in practice.

Section 1: Is the distinction between moral rightness and wrongness ultimate?

Section 2: Is the ground of political obligation always one and the same?

Section 3: Has there been in recent times any substantial change in the conceptions of freedom and responsibility?

Section 4: Recent suggestions in the theory of fine art.

DIVISION D. *History of Philosophy*—General Session: In what respects has philosophy progressed?

Section 1. Ancient philosophy: What is alive and what is dead in the philosophy of classical antiquity?

Section 2. (*a*) Medieval philosophy: The philosophical problems at issue in the XIIIth and XIVth centuries.

(*b*) Oriental Philosophy: What contributions have been made to philosophy by eastern philosophers (including Jews and Western Arabs)?

Section 3. Philosophy of the XVIIth and XVIIIth centuries: Is it necessary for students of philosophy to go behind Kant?

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